

derm. When the blastoderm has thus given birth to the mesoderm and endoderm, it persists as a simple cellular layer around the layers which arise from it, and constitutes the ectoderm. In short, the primitive blastoderm is alone the origin of the three layers; the cells of which it is composed multiply rapidly, and group themselves in two different ways; some remain at the periphery and will form part of the ectoderm, while the rest penetrate into the ovule and represent a meso-endoderm, which will differentiate into the two final inner layers.

One of the most important facts is the diffuse genesis of the mesoderm by almost the entire blastoderm: a second is the double origin of the endoderm, the two original zones being separated by a vast space. These two peculiarities taken together are really characteristic, for we do not meet with them in the condensed developments of the rest of the Cœlomata. Finally, a concluding phenomenon of great value is presented by the enteron or primitive intestine, which hollows itself out in the interior of the embryo without in any way proceeding from a gastrular invagination, and does not even present a trace of such a primordial origin; here, again, is a contrast to the condensed developments of the other Cœlomata. At the present moment I am continuing my investigations and extending them to the Podophthalmata; I shall shortly have occasion to show that they exhibit the same phenomena as the Edriophthalmata, and that the blastodermic depressions, considered by divers authors, by Reichenbach and Bobretzky among others, as gastrular invaginations, have not, in reality, such a significance.—*Comptes Rendus*, tome cxiii. no. 24 (December 14, 1891), pp. 868-870.

*A new Mode of Respiration in the Myriapoda.* By F. G. SINCLAIR (formerly F. G. HEATHCOTE), M.A., Fellow of the Cambridge Philosophical Society.

The Scutigeraidæ respire by means of a series of organs arranged in the middle dorsal line at the posterior edge of every dorsal scale except the last.

Each organ consists of a slit bounded by four curved ridges, two at the edges of the slit and two external to the latter. The slit leads into an air-sac. From the sac a number of tubes are given off; these tubes are arranged in two semicircular masses. The ends of the tubes project into the pericardium in such a manner that the ends are bathed in the blood and aërate it just before it is returned into the heart by means of the ostia. In the living animal the blood can be seen through the transparent chitin of the dorsal surface surrounding the ends of the tubes; and in the organ and surrounding tissues cut out of a Scutigera directly it is killed, the blood-corpuscles can be seen clustering round the tube ends. If the mass of tubes of a freshly killed specimen are teased out under the microscope in glycerine, they can be seen to be filled with air. The tubes each branch several times. Each tube is lined with chitin, which is a continuation of the chitin of the exo-skeleton. Each tube is also clothed with cells, which are a continuation of the hypodermis. The tubes end in a blunt point of very delicate chitin.

*Reasons for supposing these Organs to be Respiratory.*

1. There are no other organs which could be supposed to be respiratory in function.

2. The tubes are chitinous, and the chitin grows thin and membranous towards the end, affording a good opportunity for interchange of gases.

3. The tube ends project into the pericardium, so that they are bathed with the blood.

4. The tubes are filled with air.

5. The organ is so placed as to aërate the blood just before it returns to the heart.

6. In *Scutigera* the dorsal scales do not agree in number with the legs. The organs are arranged on the dorsal scales: that is they are not arranged in correspondence with the mesoblastic or primitive segmentation (see a former paper before this Society, "The Post-Embryonic Development of *Julus terrestris*," 1888). This renders it probable that they are not a primitive development, but a recent modification, agreeing with the fact that all other Myriapods breathe by the more primitive method of tracheæ.

This mode of respiration differs from that in other Myriapods in the following particulars:—

1. The tubes are collected into one definite organ, instead of being distributed about the body.

2. The tubes have no spiral thread.

3. In acting on the blood just before it returns to the heart, so that aërated blood is distributed instead of unaërated.

It resembles the tracheæ of other Myriapods in the following particulars:—

1. In the air-sac into which the tubes open.

2. In the cylindrical form of the tubes.

3. In the branching of the tubes.

The organs resemble the tracheal lungs of Spiders—

1. In the large air-sac.

2. In the number of tubes opening into an air-sac.

3. In the arrangement for bathing the tubes with blood in a blood-sinus.

4. In the supply of aërated blood by the heart.

They differ from them in—

1. The form of the tubes, which in *Scutigera* are cylindrical.

2. In the absence of the membrane which in Spiders surrounds the organ.

I therefore hold that the respiratory organ in *Scutigera* holds a position intermediate between the tracheæ of Myriapods and the lungs of Spiders. I hold with A. Leuckart ('*Zeitsch. für wiss. Zool.*' vol. i. p. 246, 1849, "Ueber den Bau und Bedeutung der sog. Lungen bei den Arachniden") that the tracheæ have developed into the lungs of Spiders and Scorpions, and I think that the organs in question form a series of which the lowest term is the tracheæ, the next the organ of *Scutigera*, then the lungs of Spiders, and then of Scorpions.—*Proc. Roy. Soc.* No. 303, pp. 200, 201 (Nov. 26, 1891).